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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/001,437	10/31/2001	Benjamin N. Eldridge	P133-US	2383

7590 02/14/2003

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EXAMINER	
ROMAN, ANGEL	
ART UNIT	PAPER NUMBER
2812	

DATE MAILED: 02/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/001,437	ELDRIDGE ET AL.	
	Examiner	Art Unit	
	Angel Roman	2812	

-- Th MAILING DATE of this communication appears on the cov r sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) *16-21 and 32-34* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15,22,24-30,35,36,38 and 43* is/are rejected.

7)☒ Claim(s) *23,31,37,39-42 and 44* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 October 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-15, 22-31 and 35-44, drawn to a method of making a semiconductor device, classified in class 438, subclass 460.

   II. Claims 16-21 and 32-34, drawn to a semiconductor device, classified in class 257, subclass 1+.

2. The inventions are distinct, each from the other because of the following reasons: Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case instead of providing an unsingulated semiconductor wafer a singulated semiconductor wafer could be provided.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with N.Kenneth Burraston on 04/22/02 a provisional election was made without traverse to prosecute the invention of group I, claims 1-15, 22-31 and 35-44. Affirmation of this election must be made by applicant in replying to this Office action. Claims 16-21 and 32-34 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. It is suggested that Applicant cancel non-elected claims 16-21 and 32-34 in response to this Office Action.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000.

Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claims 1-3, 5, 10, 11 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by La Chapelle, Jr. et al. U.S. Patent 4,086,375.

La Chapelle, Jr. et al discloses a method for providing an unsingulated semiconductor wafer comprising a plurality of dice formed thereon, each said die having a plurality of electrical terminals 28 disposed within a boundary of said die, forming elongated interconnect elements 32 on at least one of said dice, said interconnect elements 32 extending beyond the boundary of said at least one die, said interconnect elements 32 being in electrical communication with the terminals of said at least one die (see figure 2); and thereafter singulating said wafer into individual dice (see column 8, lines 4-5).

Said interconnect elements 32 are formed on a plurality of said dice such that interconnect elements 32 on adjacent dice are interposed between each other in interleaved fashion and extending across a scribe street between said at least one die and a neighboring die and into the boundary of said neighboring die. (see figure 2).

The singulating comprises; affixing a fixative to said wafer, dicing said wafer along scribe streets between said dice, and removing individual die from said fixative by adhering a stretchy material to said plurality of dice, and, after singulating said wafer, stretching said stretchy material to increase space between said dice (see column 8, lines 5-20).

The dicing process is performed from a side of said wafer opposite a side on which said plurality of terminals are disposed (see column 8, lines 8-10).

Said elongated interconnect elements are lithographically formed (see figures 3A-3E).

7. Claims 1, 13, 14, 22, 29 and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Haji et al. U.S. Patent 6,350,664.

Haji et al. discloses a method comprising; providing an unsingulated semiconductor wafer 1 comprising a plurality of dice formed thereon (see figure 1(a)), each said die having a plurality of electrical terminals 2 disposed within a boundary of said die (see figure 1(a)), forming elongate interconnect elements 6 on at least one of said dice, said interconnect elements extending beyond the boundary of said at least one die, said interconnect elements being in electrical communication with the terminals of said at least one die (see figure 2(b)); and thereafter singulating said wafer into individual dice (see figure 2(d)).

Haji et al. also discloses a method comprising; providing an unsingulated semiconductor wafer 1 comprising a plurality of dice formed thereon, each said die having a plurality of electrical terminals 2 disposed within a boundary of said die; forming packaging on at least one of said dice, said packaging including a plurality of extensions 5 extending beyond the boundary of said at least one die; forming on said plurality of extensions a plurality of interconnect elements 6, said interconnect elements

6 being in electrical communication with the terminals 2 of said at least one die; and thereafter singulating said wafer into individual dice (see figures 2a-2d).

The wafer is grinded and polished prior to singulating said wafer (see figures 1(c) and 4(a)).

8. Claims 35 and 43 are rejected under 35 U.S.C. 102(e) as being anticipated by Hedler U.S. Patent 6,406,937.

Hedler discloses a method comprising; providing an unsingulated semiconductor wafer 12 comprising a plurality of dice formed thereon, each said die having a plurality of electrical terminals disposed within a boundary of said die, applying a first fixative 13 comprising a sawing sheet (e.g. dicing tape) to a back side of said wafer, said back side of said wafer being a side opposite a side on which said electrical terminals are formed; singulating said wafer from a front side of said wafer while said first fixative is applied to said wafer (see figure 2); and lithographically forming elongate interconnect elements (27, 28, 29, 30) on at least one of said dice while said first fixative is applied to said singulated wafer, said interconnect elements extending beyond the boundary of said at least one die, said interconnect elements being in electrical communication with the terminals of said at least one die (see figure 3).

9. Claims 1 and 6-9 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Eldridge et al. U.S. Patent 5,897,326.

Eldridge et al. discloses a method comprising; providing an unsingulated semiconductor wafer comprising a plurality of dice formed thereon, each said die having a plurality of electrical terminals disposed within a boundary of said die, forming resilient elongate interconnect elements on at least one of said dice, said interconnect elements extending beyond the boundary of said at least one die, said interconnect elements being in electrical communication with the terminals of said at least one die and comprising an inner wire core and a coating, wherein said coating is formed of a material that is stronger and more resilient than said wire core (see Abstract); and thereafter singulating said wafer into individual dice (see figure 4f).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over La Chapelle, Jr. et al. U.S. Patent 4,086,375.

La Chapelle, Jr. et al. is applied as above but lacks anticipation on specifying the fixative comprising adhesive tape. The particular type of material used to make the fixative, is only considered to be the use of a " preferred " or " optimum " material out of a plurality of well known materials that a person having ordinary skill in the art at the time the invention was made would have find obvious to provide using routine

experimentation; therefore it would have been obvious to use a fixative comprising adhesive tape in the primary reference of La Chapelle, Jr. et al. since adhesive tape is a preferred material used as flexible sheets during singulating processes.

12. Claims 12 and 24-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haji et al. U.S. Patent 6,350,664 in view of Yoshihara et al. U.S. Patent 5,824,177.

Haji et al. is applied as above but lacks anticipation on affixing a first fixative comprising adhesive tape to a front side of said wafer, wherein said front side is a side on which said plurality of terminals are disposed, dicing said wafer along scribe streets between said dice, affixing a second fixative to a back face of said wafer, and removing said first fixative from said wafer wherein the second fixative is a stretchy material and, after singulating said wafer, the stretchy material is stretched to increase space between said dice and removing individual die from said fixative; and performing the dicing process from a side of said wafer opposite a side on which said plurality of terminals are disposed.

With respect to affixing a first fixative comprising adhesive tape to a front side of said wafer, wherein said front side is a side on which said plurality of terminals are disposed, dicing said wafer along scribe streets between said dice, affixing a second fixative to a back face of said wafer, and removing said first fixative from said wafer wherein the second fixative is a stretchy material and, after singulating said wafer, the stretchy material is stretched to increase space between said dice and removing individual die from said fixative; Yoshihara et al. discloses affixing a first fixative

comprising adhesive tape to a front side of a wafer, wherein said front side is a side on which a plurality of terminals are disposed, dicing said wafer along scribe streets between dice, affixing a second fixative to a back face of said wafer, and removing said first fixative from said wafer wherein the second fixative is a stretchy material and, after singulating said wafer, the stretchy material is stretched to increase space between said dice and removing individual die from said fixative. In view of this disclosure, it would have been obvious to a person having ordinary skills in the art at the time the invention was made to used the dicing method disclosed by Yoshihara et al. in to dice the wafer in the primary reference of Haji et al. since it would provide protection and prevent damage to the terminals during the dicing process.

Regarding performing the dicing process from a side of said wafer opposite a side on which said plurality of terminals are disposed (backside), it would have been obvious to a person having ordinary skills in the art at the time the invention was made to performed the dicing process from a backside in the primary reference of Haji at al. as modified by Yoshihara et al. since damage and contamination to the terminals may be prevented.

13. Claims 36 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hedler U.S. Patent 6,406,937.

Hedler et al. is applied as above but lacks anticipation on applying a second fixative to a front side of said wafer and removing said first fixative from said wafer. It would have been obvious to a person having ordinary skills in the art at the time the

invention was made to apply a second fixative to a front side of said wafer and to remove said first fixative from said wafer in the primary reference of Hedler in order to separate the wafers from the dicing sheet.

Allowable Subject Matter

14. Claims 23, 31, 37, 39-42 and 44 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Rosvold et al., Dando, Motooka et al. and Hagiwara et al. disclose methods of forming semiconductor devices by singulating wafer having semiconductor chips comprising elongated elements.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Angel Roman whose telephone number is (703) 306-0207. The examiner can normally be reached on Monday-Friday 8:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (703) 308-3325. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

AR
February 10, 2003

John F. Niebling
Supervisory Patent Examiner
Technology Center 2800